



## Memorandum

*To: Diane Salkie, EPA Region 2  
Elizabeth Franklin, USACE*

*From: Troy Gallagher, CDM Smith  
Keegan L. Roberts, Ph.D., PE, CDM Smith*

*Date: April 24, 2019*

*Subject: Summary of Oversight of Cap Inspection at River Mile 10.9  
March 21-22, 2019  
Lower Passaic River Restoration Project*

On behalf of the United States Environmental Protection Agency (EPA) and the United States Army Corps of Engineers (USACE), Kansas City District, CDM Federal Programs Corporation (CDM Smith) traveled to the River Mile (RM) 10.9 removal area on the Passaic River on March 21 and 22, 2019 and provided field technical oversight for the annual visual inspection of the sediment cap. Poling was begun by boat on March 21, 2019, and finished on March 22, 2019 along 12 transects across the cap at 10-foot intervals to confirm the presence of the armor layer below the overlying sediments, and to measure the depth to these overlying soft sediments and the depth to armor layer from the water surface. Armor layer thicknesses were not assessed during the inspection.

Transects A through J were perpendicular to the shore with these ten transects intercepting the 2016 SPME sampler stations. The other two transects (X and Y) were located at the southern-most and northern-most ends of the cap, respectively, and were also perpendicular to the shore. Field activities were conducted by Ocean Surveys, Inc. (OSI) on behalf of the Cooperating Parties Group (CPG), and oversight was provided by Troy Gallagher from CDM Smith.

The approximate transects are presented in **Figure 1** and are similar to the transects utilized during the 2018 inspection event. The poling points displayed in Figure 1 are from the August 2017 (not 2019) cap inspection and are provided for historical reference purposes only. GPS coordinates of the March 21-22, 2019 cap inspection poling points have not yet been received from the CPG as of the date of this memorandum. Photographs of field activities are presented in **Attachment 1**, a copy of the field logbook notes is provided in **Attachment 2**. **Table 1** presents a summary of the field notes and point measurements.

## Summary of March 21, 2019 Field Activities

### Personnel in Attendance

Troy Gallagher – CDM Smith  
Alexander Unrein – OSI  
Hugh Lincoln - OSI

Upon arrival to the dock located at 1 Madison Street in East Rutherford, NJ, the OSI crew, Alexander Unrein and Hugh Lincoln, were setting up the equipment on the boat that would be taken out to the River Mile 10.9 (RM 10.9) observation area. It was already lightly raining around this time, and it was very windy. Around 7:45, the boat left the dock to head to RM 10.9 of the Passaic River. Before any sediment and armor measurements were taken, the boat headed to the De Jessa Bridge, downriver from the cap to calibrate the GPS unit and measure the height from the water surface to a known point on the bridge to get a tide measurement. After calibration, the poling event began at transect X.

Depth from the water surface to the top of overlying sediment was measured with a rigid plastic telescoping measuring pole with a flat disk-shaped bottom. The flat bottom allowed the measuring pole to rest on the sediment surface while the measurement was taken. Depth from the water surface to the top of the armor layer was measured with a long metal rod affixed with measuring tape. Depth to overlying sediment and depth to armor layer were recorded for each point unless the armor layer was not present. If the armor layer was not present, depth to the geotextile mat that lies underneath the armor was recorded instead. At off-cap locations, only depth to overlying sediment was recorded. At locations where no armor was detected, but was still on-cap, an offset measurement was taken at a location near the proposed location until armor was found. The exact coordinates of the offset measurement were taken by OSI crew. These offset measurements are described below in **Table 1** in the comments section of the nearest location. An attempt was made to measure the same locations that were observed during the last poling event in September 2018 to provide useful data.

Starting on each transect at locations nearest the shoreline when possible, measurements were taken about every ten feet moving towards the center of the river. **Table 1** shows the recorded depths to sediment and armor taken at each transect. During this day of poling, most of the deep locations on each transect were attempted due to low tide being around 3pm. Depth to sediment and depth to armor measurements were taken from 8:25 to 15:15 on this day at all transects. The weather was rainy and cold throughout the day, but this did not impact any of the measurements taken. There were several locations measured that did not have detected armor and only geotextile mat was recorded. These specific locations are noted in **Table 1**. Locations where no armor was found in September 2018 nor during this event did not have offset measurements taken.

At 15:20, OSI crew steered the boat up to transect Y to take pictures of the shoreline during low tide. While driving the boat downstream along the length of the observation area, several pictures were taken of the mud flats near the shoreline that were exposed due to low water levels. Once the boat arrived at transect X, after taking pictures, we headed back to the De Jessa bridge south of the

observation area to measure down to the water surface from the marked location on the bridge to get a final reading of the tide. The boat then headed back to the docking location as observations were complete for this day.

## **Summary of March 22, 2019 Field Activities**

### **Personnel in Attendance**

Troy Gallagher – CDM Smith  
Alexander Unrein – OSI  
Hugh Lincoln – OSI

The goal of the poling on this day was to complete the locations on each transect that were not measured on the previous day. At 8:00, the OSI crew began the preparations for the field event. It was noticeably windier than the previous day, so extra precautions were made to ensure boat safety. The strong gusts of wind throughout the day pushed the boat off location several times while poling, leading to multiple readings being taken at several locations to ensure accurate marks. Due to heavy rains the previous day, the river current was also particularly strong for this day of poling, but this did not affect the observations. Unrein and Lincoln measured the distance from the water surface to a known point on the dock to get a reading of the tide and calibrated the GPS unit before heading out. At 8:30, the boat departed from the dock to head towards RM10.9 to begin observations at transect J.

The same procedures as the previous day were used to measure depth to sediment and depth to armor at locations along each transect. From 8:50 to 14:30, depth to armor measurements were taken at all remaining locations to complete the cap inspection event. Similar to measurements taken on the previous day, there were multiple transect locations that did not have armor. These specific locations are shown in **Table 1** along with information on the offset measurements taken for each location. During one of the measurements at location E-10, while measuring the depth to sediment, the telescoping pole broke at one of the joints due to strong currents applying pressure to the pole. This was fixed with electrical tape and zip ties and the cap inspection resumed shortly after.

Transects G, X, and Y were noticeably patchy in their coverage of armor. These transects had many locations where no armor was found, only geotextile mat. These locations are noted below in **Table 1**.

**Table 1: March 21-22, 2019 Cap Inspection Summary**

Date	Time	Transect	Location	Depth to Sediment from Water Surface (in)	Depth to Armor Layer from the Water Surface (in)	Thickness of Sediment Layer above Armor Layer (in)	Comment
3/21/2019	8:27	A	A-1	52.8	63.6	10.8	---
3/21/2019	8:33		A-2	57.6	66	8.4	---
3/21/2019	8:36		A-3	57.6	75.6	18	Remeasured depth to armor due to first measurement being shallower than sediment layer.
3/21/2019	8:41		A-4	82.8	90	7.2	---
3/21/2019	8:47		A-5	87.6	115.2	27.6	---
3/22/2019	12:39		A-6	76.8	N/A	NC	No armor detected. Depth to geotextile mat 111.6 inches. Offset measured about 15 feet south of A-6, depth to sediment 75.6 inches, depth to armor 106.8 inches. Thickness of sediment is 31.2 inches.
3/22/2019	12:45		A-7	86.4	N/A	NC	No armor detected. Depth to geotextile mat 120 inches. Offset measured about 15 feet south of A-7, depth to sediment 82.8 inches, depth to armor 111.6 inches. Thickness of sediment is 28.8 inches.
3/22/2019	12:52		A-8	96	128.4	32.4	---
3/22/2019	12:54		A-9	102	N/A	NC	No armor detected. Depth to geotextile mat 139.2 inches. Offset measured about 15 feet south of A-9, depth to sediment 97.2 inches, depth to armor 128.4 inches. Thickness of sediment is 31.2 inches.

Diane Salkie and Elizabeth Franklin

April 24, 2019

Page 5

Date	Time	Transect	Location	Depth to Sediment from Water Surface (in)	Depth to Armor Layer from the Water Surface (in)	Thickness of Sediment Layer above Armor Layer (in)	Comment
3/22/2019	13:00	A	A-10	114	N/A	NC	No armor detected. Depth to geotextile mat 150 inches. Offset measured about 15 feet south of A-10, depth to sediment 111.6 inches, depth to armor 140.4 inches. Thickness of sediment is 28.8 inches.
3/21/2019	13:50		A-11	94.8	N/A	NC	No armor found. Depth to geotextile mat 139.2 inches.
3/21/2019	13:53		A-12	118.8	N/A	NC	No armor found. Depth to geotextile mat 152.4 inches.
3/21/2019	13:55		A-13	142.8	N/A	NC	No armor found. Depth to geotextile mat 180 inches.
3/21/2019	9:11	B	B-1	69.6	84	14.4	---
3/21/2019	9:17		B-2	78	N/A	NC	No armor detected. Depth to geotextile mat 91.2 inches. Offset measured 10 feet north of B-2, sediment measured at 79.2 inches and armor at 96 inches. Thickness of sediment is 16.8 inches.
3/21/2019	9:27		B-3	82.8	104.4	21.6	---
3/22/2019	12:12		B-4	81.6	96	14.4	---
3/22/2019	12:15		B-5	85.2	100.8	15.6	---
3/22/2019	12:20		B-6	91.2	112.8	21.6	---
3/22/2019	12:23		B-7	94.8	112.8	18	---
3/22/2019	12:27		B-8	102	124.8	22.8	---
3/22/2019	12:32		B-9	104.4	N/A	NC	No armor detected. Depth to geotextile mat 136.8 inches.
3/22/2019	12:30		B-10	104.4	130.8	26.4	---

Date	Time	Transect	Location	Depth to Sediment from Water Surface (in)	Depth to Armor Layer from the Water Surface (in)	Thickness of Sediment Layer above Armor Layer (in)	Comment
3/22/2019	12:35	B	B-11	104.4	N/A	NC	No armor detected. Depth to geotextile mat 146.4 inches.
3/21/2019	13:40		B-12	94.8	N/A	NC	No armor found. Depth to geotextile mat 118.8 inches.
3/21/2019	13:43		B-13	103.2	N/A	NC	No armor found. Depth to geotextile mat 123.6 inches.
3/21/2019	13:45		B-14	117.6	N/A	NC	No armor found. Depth to geotextile mat 144 inches.
3/21/2019	13:47		B-15	100.8	N/A	NC	No armor found. Depth to geotextile mat 115.2 inches.
3/21/2019	9:33	C	C-1a	37.2	N/A	NC	No armor detected (off cap). Location closer to shore than C-1, named C-1a.
3/21/2019	9:35		C-1	42	49.2	7.2	Armor was described to have gravel texture, but still identified as armor.
3/21/2019	9:37		C-2	61.2	69.6	8.4	Measured twice due to first reading observing texture of gravel instead of armor.
3/21/2019	9:43		C-3	66	75.6	9.6	---
3/21/2019	12:47		C-4	36	46.8	10.8	---
3/21/2019	12:51		C-5	39.6	52.8	13.2	---
3/21/2019	12:53		C-6	42	52.8	10.8	---
3/21/2019	12:57		C-7	45.6	63.6	18	---
3/21/2019	13:01		C-8	50.4	68.4	18	---
3/21/2019	13:06		C-9	55.2	80.4	25.2	---
3/21/2019	13:09		C-10	55.2	79.2	24	---

Date	Time	Transect	Location	Depth to Sediment from Water Surface (in)	Depth to Armor Layer from the Water Surface (in)	Thickness of Sediment Layer above Armor Layer (in)	Comment
3/21/2019	13:12	C	C-11	66	103.2	37.2	---
3/21/2019	13:15		C-12	76.8	110.4	33.6	---
3/21/2019	13:17		C-13	82.8	123.6	40.8	---
3/21/2019	13:21		C-14	91.2	128.4	37.2	---
3/21/2019	13:25		C-15	103.2	N/A	NC	No armor found. Depth to geotextile mat 140.4 inches.
3/21/2019	13:31		C-16	115.2	N/A	NC	No armor or geotextile mat found. Reached sandy/clay material at 168 inches, no refusal.
3/21/2019	9:46	D	D-1a	62.4	N/A	NC	No armor detected. Depth to geotextile mat 84 inches. No offset measure because not original location.
3/21/2019	9:51		D-1	64.8	N/A	NC	No armor detected. Depth to geotextile mat 96 inches. Offset measured 7 feet south of D-1, sediment measured at 64.8 inches and armor at 75.6 inches. Thickness of sediment is 10.8 inches.
3/21/2019	9:58		D-2	68.4	N/A	NC	No armor detected. Depth to geotextile mat 92.4 inches. Offset measured 8 feet south of D-2, sediment measured at 68.4 inches and armor at 79.2 inches. Thickness of sediment is 10.8 inches.
3/21/2019	10:07		D-3	69.6	82.8	13.2	---
3/21/2019	12:34		D-4	46.8	61.2	14.4	---
3/21/2019	12:40		D-5	49.2	67.2	18	---

Date	Time	Transect	Location	Depth to Sediment from Water Surface (in)	Depth to Armor Layer from the Water Surface (in)	Thickness of Sediment Layer above Armor Layer (in)	Comment
3/21/2019	12:42	D	D-6	55.2	73.2	18	---
3/21/2019	12:45		D-7	58.8	80.4	21.6	---
3/22/2019	11:26		D-8	97.2	N/A	NC	No armor detected. Depth to geotextile mat 123.6 inches. Offset measured about 15 feet south of D-8, depth to sediment 98.4 inches, depth to armor 111.6 inches. Thickness of sediment is 13.2 inches.
3/22/2019	11:34		D-9	100.8	126	25.2	---
3/22/2019	11:37		D-10	106.8	135.6	28.8	---
3/22/2019	11:45		D-11	112.8	151.2	38.4	---
3/22/2019	11:49		D-12	126	N/A	NC	No armor detected. Depth to geotextile mat 160.8 inches. Offset measured near location D-18 from last event, depth to sediment 116.4 inches, depth to armor 152.4 inches. Thickness of sediment is 36 inches.
3/21/2019	14:13		D-13	82.8	109.2	26.4	---
3/21/2019	14:15		D-14	86.4	118.8	32.4	---
3/21/2019	14:17		D-15	94.8	127.2	32.4	---
3/21/2019	14:22		D-16	106.8	N/A	NC	No armor found. Depth to geotextile mat 140.4 inches.
3/21/2019	14:24		D-17	112.8	N/A	NC	No armor found. Depth to geotextile mat 156 inches.
3/22/2019	11:58		D-19	130.8	164.4	33.6	---
3/22/2019	12:00		D-20	130.8	164.4	33.6	---
3/21/2019	10:12	E	E-1	57.6	68.4	10.8	---



Date	Time	Transect	Location	Depth to Sediment from Water Surface (in)	Depth to Armor Layer from the Water Surface (in)	Thickness of Sediment Layer above Armor Layer (in)	Comment
3/21/2019	10:20	E	E-2	63.6	79.2	15.6	---
3/21/2019	10:23		E-3	64.8	79.2	14.4	---
3/21/2019	10:25		E-4	67.2	79.2	12	---
3/21/2019	12:15		E-5	50.4	67.2	16.8	---
3/21/2019	12:17		E-6	52.8	64.8	12	---
3/21/2019	12:25		E-7	55.2	67.2	12	---
3/21/2019	12:27		E-8	60	70.8	10.8	---
3/21/2019	12:30		E-9	64.8	82.8	18	---
3/22/2019	10:55		E-10	102	133.2	31.2	Sediment measuring rod broke during this measurement due to strong current, repaired and remeasured.
3/22/2019	11:12		E-11	104.4	134.4	30	---
3/22/2019	11:17		E-12	114	156	42	---
3/21/2019	14:30		E-14	79.2	115.2	36	---
3/21/2019	14:31		E-15	97.2	N/A	NC	No armor found, depth to sandy/gravel material 122.4 inches.
3/21/2019	14:35		E-16	111.6	N/A	NC	No armor found. Depth to geotextile mat 128.4 inches.
3/21/2019	10:30	F	F-1	57.6	N/A	NC	No armor detected. Depth to geotextile mat 64.8 inches. (off cap)
3/21/2019	10:37		F-2	60	69.6	9.6	---
3/21/2019	10:41		F-3	62.4	73.2	10.8	---
3/21/2019	10:47		F-4	64.8	73.2	8.4	---
3/21/2019	10:53		F-5	66	78	12	---

Date	Time	Transect	Location	Depth to Sediment from Water Surface (in)	Depth to Armor Layer from the Water Surface (in)	Thickness of Sediment Layer above Armor Layer (in)	Comment
3/21/2019	11:45	F	F-6	57.6	74.4	16.8	---
3/21/2019	11:51		F-7	60	N/A	NC	No armor detected. Depth to geotextile mat 76.8 inches. Offset measured 8 feet north of F-7, sediment measured at 58.8 inches and armor at 76.8 inches. Thickness of sediment is 18 inches.
3/21/2019	11:57		F-8	60	74.4	14.4	---
3/21/2019	12:00		F-9	60	79.2	19.2	---
3/21/2019	12:03		F-10	62.4	86.4	24	---
3/21/2019	12:07		F-11	64.8	93.6	28.8	---
3/21/2019	12:09		F-12	67.2	103.2	36	---
3/22/2019	10:35		F-13	102	134.4	32.4	---
3/22/2019	10:38		F-14	115.2	144	28.8	---
3/22/2019	10:45		F-15	124.8	166.8	42	---
3/22/2019	10:41		F-16	138	166.8	28.8	---
3/21/2019	14:41		F-17	88.8	N/A	NC	No armor found. Depth to geotextile mat 124.8 inches.
3/21/2019	14:43		F-18	112.8	N/A	NC	No armor found. Depth to geotextile mat 132 inches.
3/21/2019	11:00	G	G-1	58.8	N/A	NC	No armor detected. Depth to geotextile mat 75.6 inches. Offset measured 8 feet south of G-1, sediment measured at 61.2 inches and armor at 76.8 inches. Thickness of sediment is 15.6 inches.
3/21/2019	11:02		G-2	68.4	79.2	10.8	---

Diane Salkie and Elizabeth Franklin

April 24, 2019

Page 11

Date	Time	Transect	Location	Depth to Sediment from Water Surface (in)	Depth to Armor Layer from the Water Surface (in)	Thickness of Sediment Layer above Armor Layer (in)	Comment
3/22/2019	9:37	G	G-3	86.4	N/A	NC	No armor detected. Depth to geotextile mat 96 inches. Off set measured about 20 feet south of G-3, depth to sediment 84 inches, depth to armor 91.2 inches. Thickness of sediment is 7.2 inches.
3/22/2019	9:45		G-4	91.2	103.2	12	Boat drifted off-location during measurement and poling revealed geotextile mat. Remeasured once back on G-4 location and observed armor.
3/22/2019	9:49		G-5	96	N/A	NC	No armor detected. Depth to geotextile mat 112.8 inches. Off set measured about 15 feet south of G-5, depth to sediment 94.8 inches, depth to armor 103.2 inches. Thickness of sediment is 8.4 inches.
3/22/2019	9:55		G-6	102	120	18	
3/22/2019	9:58		G-7	103.2	N/A	NC	No armor detected. Depth to geotextile mat 127.2 inches. Off set measured about 15 feet south of G-7, depth to sediment 102 inches, depth to armor 114 inches. Thickness of sediment is 12 inches.
3/22/2019	10:08		G-8	105.6	129.6	24	---
3/22/2019	10:11		G-9	108	133.2	25.2	---

Diane Salkie and Elizabeth Franklin

April 24, 2019

Page 12

Date	Time	Transect	Location	Depth to Sediment from Water Surface (in)	Depth to Armor Layer from the Water Surface (in)	Thickness of Sediment Layer above Armor Layer (in)	Comment
3/22/2019	10:15	G	G-10	117.6	N/A	NC	No armor detected. Depth to geotextile mat 144 inches. Offset measured about 15 feet south of G-10, depth to sediment 117.6 inches, depth to armor 157.2 inches. Thickness of sediment is 39.6 inches.
3/22/2019	10:20		G-11	124.8	N/A	NC	No armor detected. Depth to geotextile mat 139.2 inches.
3/22/2019	10:23		G-12	135.6	N/A	NC	No armor detected. Depth to geotextile mat 184.8 inches.
3/22/2019	11:21		G-13	118.8	166.8	48	---
3/21/2019	11:10	H	H-1	43.2	46.8	3.6	---
3/21/2019	11:14		H-2	61.2	68.4	7.2	---
3/22/2019	9:21		H-3	93.6	105.6	12	---
3/22/2019	14:14		H-3.5	64.8	69.6	4.8	Location was between H-3 and H-4, given name H-3.5 by OSI.
3/22/2019	9:25		H-4	109.2	120	10.8	---
3/22/2019	9:28		H-5	117.6	128.4	10.8	---
3/22/2019	9:30		H-6	120	144	24	---
3/22/2019	9:34		H-7	126	148.8	22.8	---

Date	Time	Transect	Location	Depth to Sediment from Water Surface (in)	Depth to Armor Layer from the Water Surface (in)	Thickness of Sediment Layer above Armor Layer (in)	Comment
3/22/2019	14:16	H	H-8	87.6	N/A	NC	No armor or geotextile mat found. Depth to gravel material 130.8 inches.
3/22/2019	14:20		H-9	93.6	N/A	NC	No armor or geotextile mat found. "Soft refusal" reached at 175 inches, pole was not long enough to continue but was only in mud, could have kept going deeper.
3/21/2019	11:20	I	I-1	78	81.6	3.6	---
3/22/2019	9:17		I-2	103.2	109.2	6	---
3/22/2019	9:12		I-3	106.8	120	13.2	---
3/22/2019	9:08		I-4	116.4	139.2	22.8	---
3/22/2019	9:05		I-5	126	142.8	16.8	---
3/21/2019	14:46		I-6	82.8	N/A	NC	No armor found. Depth to geotextile mat 118.8 inches.
3/21/2019	14:49		I-7	90	130.8	40.8	---
3/21/2019	14:51		I-8	94.8	134.4	39.6	---
3/21/2019	11:23	J	J-1	70.8	87.6	16.8	---
3/22/2019	8:57		J-2	102	118.8	16.8	---
3/22/2019	9:00		J-3	116.4	133.2	16.8	---
3/22/2019	8:55		J-4	136.8	163.2	26.4	---
3/21/2019	14:56		J-5	94.8	111.6	16.8	---

Date	Time	Transect	Location	Depth to Sediment from Water Surface (in)	Depth to Armor Layer from the Water Surface (in)	Thickness of Sediment Layer above Armor Layer (in)	Comment
3/21/2019	15:00		J-6	111.6	N/A	NC	No armor found. Depth to geotextile mat 130.8 inches.
3/21/2019	14:58		J-7	114	N/A	NC	No armor found. Depth to geotextile mat 128.4 inches.
3/21/2019	8:55	X	X-1a	49.2	55.2	6	Poling location was closer to shore than X-1, given location name X-1a.
3/21/2019	8:57	X	X-1	52.8	68.4	15.6	---
3/21/2019	9:01		X-2	61.2	N/A	NC	No armor detected. Depth to geotextile mat 76.8 inches. Offset measured 10 feet north of X-2, sediment measured at 62.4 inches and armor at 97.2 inches. Thickness of sediment is 34.8 inches.
3/21/2019	9:07		X-3	68.4	82.8	14.4	---
3/22/2019	13:08		X-4	52.8	63.6	10.8	---
3/22/2019	13:10		X-5	60	82.8	22.8	---
3/22/2019	13:15		X-6	62.4	N/A	NC	No armor or geotextile mat found. Reached gravel material at 84 inches.
3/22/2019	13:45		X-7	69.6	N/A	NC	No armor detected. Depth to geotextile mat 110.4 inches. Offset measured north of X-7, no armor found, depth to sediment 69.6 inches, depth to gravel 112.8 inches. Thickness of sediment is 43.2 inches.
3/22/2019	13:41		X-8	62.4	N/A	NC	No armor detected. Depth to geotextile mat 94.8 inches.

Diane Salkie and Elizabeth Franklin

April 24, 2019

Page 15

Date	Time	Transect	Location	Depth to Sediment from Water Surface (in)	Depth to Armor Layer from the Water Surface (in)	Thickness of Sediment Layer above Armor Layer (in)	Comment
3/22/2019	13:20	X	X-9	62.4	N/A	NC	No armor detected. Depth to geotextile mat 97.2 inches. Offset measured north of X-9, no armor found, depth to sediment 62.4 inches, depth to gravel 100.8 inches. Thickness of sediment is 38.4 inches.
3/22/2019	13:47		X-10	93.6	118.8	25.2	---
3/22/2019	13:50		X-11	91.2	N/A	NC	No armor or geotextile mat found. Reached gravel material at 123.6 inches.
3/22/2019	13:55		X-12	94.8	N/A	NC	No armor or geotextile mat found. Reached refusal at 172.8 inches.
	14:00		X-13	87.6	116.4	28.8	---
3/21/2019	14:03		X-14	112.8	N/A	NC	No armor found. Depth to geotextile mat 127.2 inches.
3/21/2019	14:06		X-15	128.4	N/A	NC	No armor found. Depth to geotextile mat 146.4 inches.
3/21/2019	11:27	Y	Y-1	92.4	120	27.6	---
3/22/2019	14:25		Y-2	106.8	N/A	NC	No armor detected, depth to rock (not armor) 122.4 inches.
3/22/2019	14:30		Y-3	127.2	N/A	NC	No armor detected. Soft refusal at 174 inches.
3/22/2019	14:35		Y-4	122.4	N/A	NC	No armor detected. Depth to cobble 128.4 inches.
3/21/2019	15:04		Y-5	126	132	6	---

Diane Salkie and Elizabeth Franklin

April 24, 2019

Page 16

Date	Time	Transect	Location	Depth to Sediment from Water Surface (in)	Depth to Armor Layer from the Water Surface (in)	Thickness of Sediment Layer above Armor Layer (in)	Comment
3/21/2019	15:10	Y	Y-6	144	147.6	3.6	---
3/21/2019	15:13		Y-7	144	N/A	NC	No armor found. Depth to geotextile mat 168 inches.
3/21/2019	15:06		Y-8	140.4	146.4	6	---
3/21/2019	15:08		Y-9	146.4	N/A	NC	No armor found. Depth to geotextile mat 158.4 inches.

Acronyms:

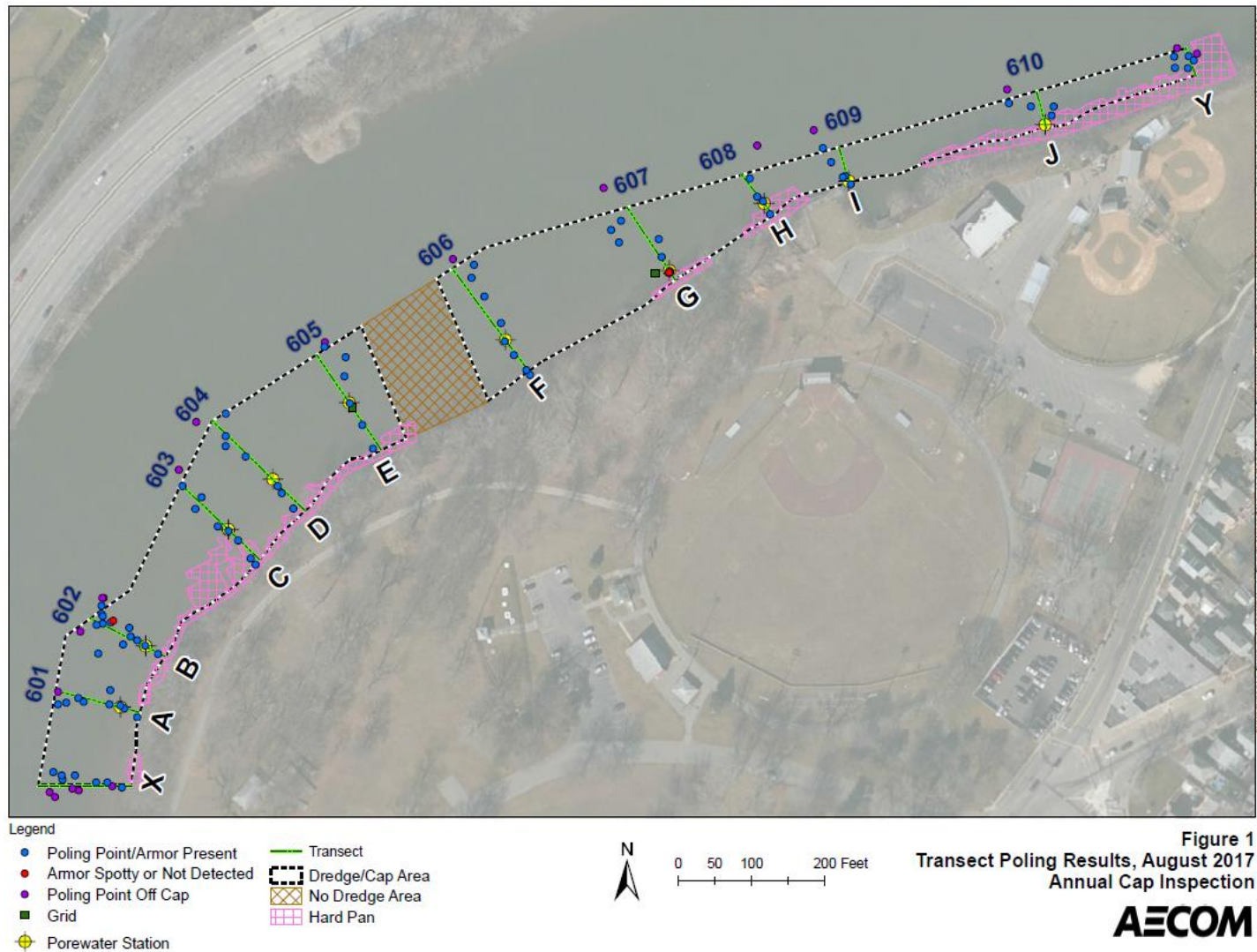
In – inches

N/A – not applicable, no armor detected

NC – not calculated



Figure 1



**Figure 1: Figure of poling/probing transects and sampler stations. Poling points displayed are from the August 21-22, 2017 cap inspection event. NOTE: An update to this figure with the poling points from the March 21-22, 2019 cap inspection will be created when the GPS coordinates of the September 2018 cap inspection are received from the CPG.**

# Attachment 1

## Photographs of Field Activities





Shoreline at location A-1 (3/21/2019 8:31)





Hugh Lincoln (OSI) poling for armor at location A-1 (3/21/2019 8:31)





Hugh Lincoln measuring depth to sediment at location X-1a (3/21/2019 8:54)





Shoreline at location B-1 looking North (3/21/2019 9:12)





Shoreline at location C-1 looking North (3/21/2019 9:35)





Shoreline at location D-1a looking North (3/21/2019 9:47)





Looking North at location E-4 during heavy rains (3/21/2019 10:26)



Shoreline at location F-1 looking North (3/21/2019 10:30)





Shoreline at location G-1 looking North (3/21/2019 10:58)



Shoreline and fenced in area located just North of location H-1 (3/21/2019 11:12)





Hugh Lincoln poling for armor at location F-6 (3/21/2019 11:48)

## Attachment 2

### Field Logbook Notes

66

Location

Lyndhurst, NJ

Date

3/21/19

Project / Client

USEPA/USACE Passaic RM10.9

Cap Inspection

Personnel: Troy Gallagher (CDM Smith)  
 Alexander Unrein (OSI)  
 Hue Lincoln (OSI)

Weather: 45°F rainy windy

PPE: Level D mustang suit, PFD

Purpose: Take sediment + armor depth measurements in Passaic River near mile 10.9.

0730 Arrive at Dock. Meet crew

0745 H+S meeting. Boat safety, staying warm

0745 Depart dock

0800 Headed to far end of river for first measurement near Nutley bridge by "Kings Court" building. Perform GPS check. Bridge is called the De Jessa.

0815 Measured GPS and tide for calibration.

0825 Arrive at transect A to begin measurements to armor and sediment.

0827 Depth to sediment at A-1 4.4 ft. Depth to armor at 5.3'

Location

Lyndhurst, NJ

Date

3/21/19

67

Project / Client

USEPA/USACE Passaic RM10.9

Cap Inspection

Had trouble getting in position due to shoreline tree branches.

833 A-2, depth to sediment 4.8' depth to armor 5.5'

836 Arrive A-3, depth to sediment 5.3'. Depth to armor 5.6'. Will measure again due to armor being higher than sediment.

838 Re-measure A-3, depth to armor 6.3'.

841 Arrive A-4, depth to sediment 6.9'. Depth to armor 7.5'

847 Arrive A-5, depth to sediment 7.3'. Depth to armor 9.6'

855 Arrive at transect X to begin measurements. Depth to sediment 4.1'. Depth to armor 4.6' @

X-1a → got a little too close to shore

857 Arrive at X-1. Depth to sediment 4.4'. Depth to armor 5.7'

901 Arrive at X-2. Depth to sediment 5.1'. Depth to armor not found. Depth to mat 6.4'. Measure offset to find armor. Armor at

*Right in the rain*



Location Lyndhurst, NJ Date 3/21/19  
 Project / Client USEPA/USACE Passaic RM10.9  
Cap Inspection to 3/21/19

- 8.1', sediment at 5.2' @ about 1210 feet North of X-2 original location
- 907 X-3 depth to sediment 5.7'.  
depth to armor 6.9'
- 911 Arrive at transect B for measurements  
Depth to sediment 5.8'. Depth to armor 7.0' @ B-1
- 917 Arrive at B-2. Depth to sediment 6.5', depth to armor not found.  
Depth to mat @ 7.6'. Measure offset to find armor. Depth to armor 8.0'.  
depth to sediment 6.6' @ about 10 feet North of B-2 original location
- 927 Arrive at B-3. Depth to sediment 6.9', depth to armor 8.7'
- 933 Arrive at transect C. C-1a, depth to sediment 3.1', depth to armor not found. depth to mat 3.6'. Zander says we are off cap.
- 935 Arrive at C-1. Depth to sediment 3.5', depth to armor 4.1'. (sandy gravel texture).
- 937 Arrive at C-2, depth to sed 5.0' depth to armor 5.6'.  
feet more like gravel.

Location Lyndhurst, NJ Date 3/21/19  
 Project / Client USEPA/USACE Passaic RM10.9  
Cap Inspection

- G-2 being measured again. Depth to sed 5.1', depth to armor 5.8'
- 943 Arrive C-3, depth to sed 5.5'.  
depth to armor 6.3'
- 946 Arrive at transect D. Measure at D-1a, depth to sed. 5.2',  
depth to armor not found. Depth to mat at 7.0'
- 951 Arrive at D-1. Depth to sed 5.4'.  
depth to armor not found. depth to mat at 8.0'. Measure offset to find armor. Measure about 7 feet to the South. Depth to sed 5.4'. depth to armor 6.3'
- 958 Arrive at D-2. depth to sediment 5.7', depth to armor not found.  
depth to mat at 7.7'. Offset about 8 feet South of D-2,  
depth to sed 5.7', depth to armor 6.6'
- 1007 Arrive at D-3, depth to sed 5.8', depth to armor 6.9'
- 1012 Arrive at transect E. Measure E-1, depth to sed 4.8'

*Rite in the Rain*



70

Location Lyndhurst, NJ Date 3/21/19  
 Project / Client USEPA/USACE Passaic RM10.9  
Cap Inspection

- depth to armor 5.7'
- 1020 E-2 depth to sed 5.3', depth to armor 6.6'
- 1023 E-3 depth to sed 5.4', depth to armor 6.6'
- 1025 E-4 depth to sed 5.6', depth to armor 6.6'
- 1030 Arrive transect F. Measure at F-1, depth to sediment 4.8', depth to armor not found, depth to mat 5.4', (off-cap)
- 1037 F-2, depth to sed 5.0', depth to armor 5.8'
- 1041 F-3, depth to sed 5.2', depth to armor 6.1'
- 1047 F-4, depth to sed 5.4', depth to armor 6.1'
- 1053 F-5, depth to sed 5.5', depth to armor 6.5'
- 1100 Arrive at transect G. Measure G-1, depth to sed 4.9', depth to armor not found, depth to mat 6.3'

*76*

71

Location Lyndhurst, NJ Date 3/21/19  
 Project / Client USEPA/USACE Passaic RM10.9  
Cap Inspection

- 1102 G-2, depth to sed 5.7', depth to armor 6.6'
- 1105 G-1 measure offset, armor at 6.4', depth to sed 5.1', measurement taken 8 feet South of G-1 *6.3' to 110*
- 1110 ~~G-3~~ H-1 depth to sediment 3.6', depth to armor 3.9'
- 1114 H-2, depth to sed 5.1', depth to armor 5.7'
- 1120 Arrive at I-1, depth to sed 6.5', depth to armor 6.8'
- 1123 Arrive J-1, depth to sed 5.9', depth to armor 7.3'
- 1127 Arrive Y-1, depth to sed 7.7', depth to armor 10.0'
- 1130 Crew eats lunch.
- 1145 Arrive at F-6, depth to sed 4.8', depth to armor 6.2'
- 1151 F-7, depth to sed 5.0', ~~depth to armor 6.4'~~ 1119 depth to mat 6.4', Remeasure, depth to sed 4.9', depth to armor 6.4', about 8 feet North of F-7

*Rite in the Rain*

Location Lyndhurst, NJ Date 3/21/19  
 Project / Client USEPA/USACE Passaic RM10.9  
Cap Inspection

- 1157 F-8, depth to sed 5.0', depth to armor 6.2'  
1200 F-9, depth to sed 5.0', depth to armor 6.6'  
1203 F-10, depth to sed 5.2', depth to armor 7.2'  
1207 F-11, depth to sed 5.4', depth to armor 7.8'  
1209 F-12, depth to sed 5.6', depth to armor 8.6'  
1215 E-5, depth to sed 4.2' depth to armor 5.6'  
1217 E-6, depth to sed 4.4' depth to armor 5.4'  
1225 E-7, depth to sed 4.6', depth to armor 5.6'  
1227 E-8, depth to sed 5.0' depth to armor 5.9'  
1230 E-9, depth to sed 5.4' depth to armor 6.9'  
1234 D-4, depth to sed 3.9' depth to armor 5.1'

46  
3/21/19

Location Lyndhurst, NJ Date 3/21/19 73  
 Project / Client USEPA/USACE Passaic RM10.9  
Cap Inspection

- 1240 D-5, depth to sed 4.1' armor at 5.6'  
1242 D-6, depth to sed 4.6' depth to armor 6.1'  
1245 D-7, depth to sed 4.9' depth to armor 6.7'  
1247 C-4, depth to sed 3.0', depth to armor 3.9'  
1251 C-5, depth to sed 3.5', depth to armor 4.4'  
1253 C-6, depth to sed 3.5' depth to armor 4.4'  
1257 C-7, depth to sed 3.8', depth to armor 5.3'  
1301 C-8, depth to sed 4.2', depth to armor 5.7'  
1306 C-9, depth to sed 4.6' depth to armor 6.7'  
1309 C-10, depth to sed 4.6' depth to armor 6.6'  
1312 C-11, depth to sed 5.5' depth to armor 8.6'  
1315 C-12, depth to sed 6.4' depth to armor 9.2'

*Put in the Rain*



Location Lyndhurst, NJ Date 3/21/19  
 Project / Client USEPA/USACE Passaic RM10.9  
Cap Inspection

1317 C-13, depth to sed 6.9'  
 depth to armor 10.3'  
1321 C-14, depth to sed 7.6'  
 depth to armor 10.7'  
1325 C-15, depth to sed 8.6'  
 depth to armor not found.  
 depth to mat 11.7'  
1331 C-16, depth to sed 9.6'  
 @ 14.0' reached sandy/clay  
 material, pole was not long  
 enough to continue  
1340 B-12, depth to sed 7.9'  
 depth to mat 9.9'  
1343 B-13, depth to sed 8.6'  
 depth to mat 10.3'  
1345 B-14, depth to sed 9.8'  
 depth to mat 12.0'  
1347 B-15, depth to sed 8.4'  
 depth to armor 9.6'  
1350 A-11, depth to sed 7.9'  
 depth to mat 11.6'  
1353 A-12, depth to sed 9.9'  
 depth to mat 12.7'  
1355 A-13, depth to sed 11.9'  
 depth to mat 15'

Location Lyndhurst, NJ Date 3/21/19 75  
 Project / Client USEPA/USACE Passaic RM10.9  
Cap Inspection

1400 X-13, depth to sed 7.3'  
 depth to armor 9.7'  
1403 X-14, depth to sed 9.4'  
 depth to mat 10.6'  
1406 X-15, depth to sed 10.7'  
 depth to mat 12.2'  
1413 D-13, depth to sed 6.9'  
 depth to armor 9.1'  
1415 D-14, depth to sed 7.2'  
 depth to armor at 9.9'  
1417 D-15, depth to sed 7.9'  
 depth to armor 10.6'  
1422 D-16, depth to sed 8.9'  
 depth to mat 11.7'  
1424 D-17, depth to sed 9.4'  
 depth to mat 13'  
1430 E-14, depth to sed 6.6'  
 depth to armor 9.6'  
1431 E-15, depth to sed 8.1'  
 depth to sandy/gravel  
 material 10.2', not mat  
1435 E-16, depth to sed 9.3'  
 depth to mat 10.7'

*Plot in section*

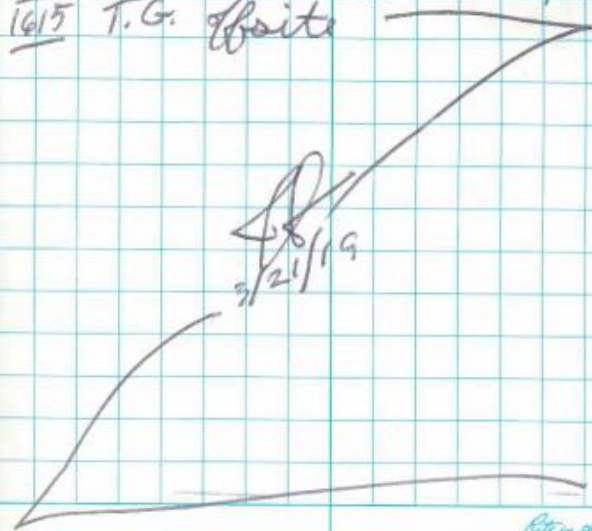
Location Lyndhurst, NJ Date 3/21/19  
 Project / Client USEPA/USACE Passaic RM10.9  
Cap Inspection

- 1441 F-17 depth to sed 7.4'  
 depth to mat 10.4'
- 1443 F-18 depth to sed 9.4'  
 depth to mat 11.0'
- 1446 I-6 depth to sed 6.9'  
~~1446~~<sup>16</sup><sub>3/21/19</sub> depth to mat 9.9'
- 1449 I-7 depth to sed 7.5'  
 depth to armor 10.9'
- 1451 I-8 depth to sed 7.9'  
 depth to armor 11.2'
- 1456 J-5 depth to sed 7.9'  
 depth to armor 9.3'
- 1458 ~~J-6~~<sup>3/21/19</sup> depth to sed 9.5'  
 depth to mat 10.7'
- ⊙ J-7
- 1500 J-6 depth to sed 9.3'  
 depth to mat 10.9'
- 1504 Y-5 depth to sed 10.5'  
 depth to armor 11.0'
- 1506 Y-8 depth to sed 11.7'  
 depth to armor 12.2'
- 1508 Y-9 depth to mat 13.2'  
 depth to sed 12.2'

76

Location Lyndhurst, NJ Date 3/21/19  
 Project / Client USEPA/USACE Passaic RM10.9  
Cap Inspection

- 1510 Y-6 depth to sed 12.0'  
 depth to armor 12.3'
- 1513 Y-7 depth to sed 12.0'  
 depth to mat 14'
- 1520 Take pictures of shoreline  
 during low tide on OSI  
 camera. Starting at transect  
 Y, and moving towards X.
- 1530 head back to De Jessa  
 bridge to measure ~~down~~<sup>to 3/21/19</sup>
- 1535 Head back to dock
- 1600 Arrive at dock and pickup
- 1615 T.G. Effate





Location Lyndhurst, NJ Date 3/22/19  
 Project / Client USEPA/USACE Passaic RM10.9  
Cap Inspection

Personell: Troy Gallagher (CDM)  
 Alexander Unrein (OSI)  
 Hue Lincoln (OSI)

Weather: 40°F, windy, rainy

PPE Level D, mustang suit, PFD

Purpose: Take sediment depths  
 and depth to armor on Passaic  
 River mile 10.9.

0745 Arrive on site and put on PPE

800 Board boat on dock. H+S  
 meeting → boat safety, stay dry,  
 slippery conditions.

820 Measuring distance from boat  
 to dock and height of the water  
 to the top of the dock.

830 Depart dock to head towards  
 RM10.9 observation area.

855 Arrive at transect J to begin  
 measurements. J-4 first location.  
 Depth to sediment 11.4', depth  
 to armor 13.6'

857 J-2, depth to sed 8.5'  
 depth to armor 9.9'. Right  
 after measurement, outflow

Location Lyndhurst, NJ Date 3/22/19 79  
 Project / Client USEPA/USACE Passaic RM10.9  
Cap Inspection

on shoreline began releasing water  
 into the area at high rate.

Video taken.

900 J-3 depth to sed 9.7'  
 depth to armor 11.1'. Getting  
 difficult to maneuver boat in the  
 wind

905 I-5 depth to sed 10.5'  
 depth to armor 11.9'

908 I-6<sup>10 ft depth</sup> depth to sed 9.7'  
 depth to armor 11.6'

912 I-7<sup>10 ft depth</sup> depth to sed 8.9'  
 depth to armor 10.0'

917 I-2 depth to sed 8.6'  
 depth to armor 9.1'

921 H-3 depth to sed 7.8'  
 depth to armor 8.8'

925 H-4 depth to sed 9.1'  
 depth to armor 10.0'

928 H-5 depth to sed 9.8'  
 depth to armor 10.7'

930 H-6 depth to sed 10.0'  
 depth to armor 12.0'

*Ritt in the Rain*



Location Lyndhurst, NJ Date 3/22/19  
 Project / Client USEPA/USACE Passaic RM 10.9  
Cap Inspection

- 934 H-7 depth to sed 10.5'  
 depth to armor 12.4'
- 937 G-3 depth to sed 7.2'  
 depth to mat 8.0'. Will  
 measure an offset reading  
 about 20 feet South of G-3  
 depth to sed 7.0', depth to  
 armor 7.6'
- 945 G-4 depth to sed 7.6'  
 depth to mat 8.3'. Drifted  
 during measurement so will try  
 again. Depth to armor found  
 at 8.6'
- 949 G-5 depth to sed 8.0'  
 depth to armor not found.  
 depth to mat at 9.4'. Offset to  
 be measured at about 15 feet  
 South of G-5. Depth to armor 8.6'  
 depth to sed 7.9'
- 955 G-6 depth to sed 8.5'  
 depth to armor 10.0'
- 958 G-7 depth to sed 8.6'  
 depth to mat 10.6'.  
 Will take offset measurement  
 at about 15 feet South of

Location Lyndhurst, NJ Date 3/22/19 81  
 Project / Client USEPA/USACE Passaic RM 10.9  
Cap Inspection

- G-7. Depth to armor 9.5'  
 depth to sed 8.5'
- 1008 G-8 depth to sed 8.8'  
 depth to armor 10.8'
- 1011 G-9 depth to sed 9.0'  
 depth to armor 11.1'
- 1015 G-10 depth to sed 9.8'  
 depth to mat 12.0'
- 1020 G-11 depth to sed 10.4'  
 depth to mat 11.6'
- 1023 G-12 depth to sed 11.3'  
 depth to ~~mat~~ <sup>sed</sup> 13.1'. Will  
 remeasure depth due to  
 running out of length on pole.  
 New depth to mat 15.4'
- 1029 Measuring offset. Depth to  
 armor 13.1', depth to sed  
 9.8'. About 15 feet South of  
 G-10 location.
- 1035 F-13 depth to sed 8.5'  
 depth to armor 11.2'
- 1038 F-14 depth to sed 9.6'  
 depth to armor 12.0'

*R. Schaefer*



Location Lyndhurst, NJ Date 3/22/19  
 Project / Client USEPA/USACE Passaic RM10.9  
Cap Inspection

1041 E-16 depth to sed 11.5'

depth to armor 13.9'

1045 F-15 depth to sed 10.4'

depth to armor 13.9'

1055 E-16 depth to sed 8.5'

depth to armor 11.1'

Sediment depth rod broke due  
to strong current. Fixed with  
electrical tape and zip ties

1112 E-11 depth to sed 8.7'

depth to armor 11.2'

1117 E-12 depth to sed 9.5'

depth to armor 13.0'

1121 E-13 depth to sed 9.9'

depth to armor 13.9'

1126 D-8 depth to sed 8.1'

depth to mat 10.3'. Will

remeasure offset. Depth to  
armor 9.3', depth to sed  
8.2', measured about 15 feet

South of D-8.

1134 D-9 depth to sed 8.4'

depth to armor 10.5'

1137 D-10 depth to sed 8.9'

depth to armor 11.3'

Location Lyndhurst, NJ Date 3/22/19  
 Project / Client USEPA/USACE Passaic RM10.9  
Cap Inspection

1145 D-11 depth to sed 9.4'

depth to armor 12.6'

1149 D-12 depth to sed 10.5'

depth to mat 13.4'. Re-

measure, depth to sed 9.7'

depth to armor 12.7'. Location  
close to D-18 from last time.

1158 D-19 depth to sed 10.9'

depth to armor 13.7'

1200 D-20 depth to sed 10.9'

depth to armor 13.7'

1212 B-4 depth to sed 6.8'

depth to armor 8.0'

1215 B-5 depth to sed 7.1'

depth to armor 8.4'

1220 B-6 depth to sed 7.6'

depth to armor 9.4'

1223 B-7 depth to sed 7.9'

depth to armor 9.4'

1227 B-8 depth to sed 8.5'

depth to armor 10.4'

1230 B-9 depth to sed 8.7'

B-10 depth to armor 10.9'

*Notes on the Rain*



Location Lyndhurst, NJ Date 3/22/19Project / Client USEPA/USACE Passaic RM 10.9Cap Inspection1232 B-9 depth to sed 8.7'  
depth to mat 11.4'1235 B-11 depth to sed 8.7'  
depth to mat 12.2'1239 A-6 depth to sed 6.4'  
depth to mat 9.3'. Re-  
measure offset. Depth to armor  
8.9', depth to sed 6.3'. About  
15 feet South of A-6.1245 A-7 depth to sed 7.2'  
depth to mat 10.0'. Redo,1248 ~~A-8~~ <sup>for 3/22/19</sup> depth to sed 6.9'  
depth to armor 9.3' at  
15' South of A-71252 A-8 depth to sed 8.0'  
depth to armor 10.7'1254 A-9 depth to sed 8.5'  
depth to mat 11.6'.Perform offset. Depth to  
armor at 10.7', depth  
to sed 8.1', at about 15  
Feet S of A-91300 A-10 depth to sed 9.5'  
depth to mat 12.5'Location Lyndhurst, NJ Date 3/22/19Project / Client USEPA/USACE Passaic RM 10.9Cap InspectionWill perform offset of A-10  
at about 15 feet South. Depth  
to armor 11.7', depth to  
sed 9.3'1308 X-4 depth to sed 4.4'  
depth to armor 5.3'1310 ~~A-6~~ <sup>for 3/22/19</sup> X-5 depth to sed  
5.0' depth to armor 6.9'1315 X-6 depth to sed 5.2'  
depth to armor not found.  
Reached gravel at 7.0',  
no cap found.1320 X-9 depth to sed 5.2'  
depth to mat 8.1'1341 X-8 depth to sed 5.2'  
depth to mat 7.9'1345 X-7 depth to sed 5.8'  
depth to mat 9.2'1347 X-10 depth to sed 7.8'  
depth to armor 9.9'1350 X-11 depth to sed 7.6'  
depth to gravel 10.3'1355 X-12 depth to sed 7.9'  
depth to refusal 14.4'*Rite in the Rain*



Location Lyndhurst, NJ Date 3/22/19  
 Project / Client USEPA/USACE Passaic RM 10.9  
Cap Inspection

no cap or mat found.

1359 Measuring offset. Depth to  
 sed 5.2' depth to gravel 8.4'  
 Location is X-9 North.

1402 Measuring offset. Depth to  
 sed 5.8' depth to gravel  
 9.4'. Location X-7 North

1414 H-3.5, depth to sed 5.4'  
 depth to armor 5.8'  
 collected between H-3/H-4

1416 H-8, depth to sed 7.3'  
 depth to gravel 10.9'

1420 H-9 depth to sed 7.8'  
 depth to "soft refusal"  
 15', pole was not long enough,  
 felt like mud all the way

1425 Y-2 depth to sed 8.9'  
 depth to "rock" 10.2',  
 doesn't feel like armor.

1430 Y-3 depth to sed 10.6'  
 depth to soft refusal 14.5'

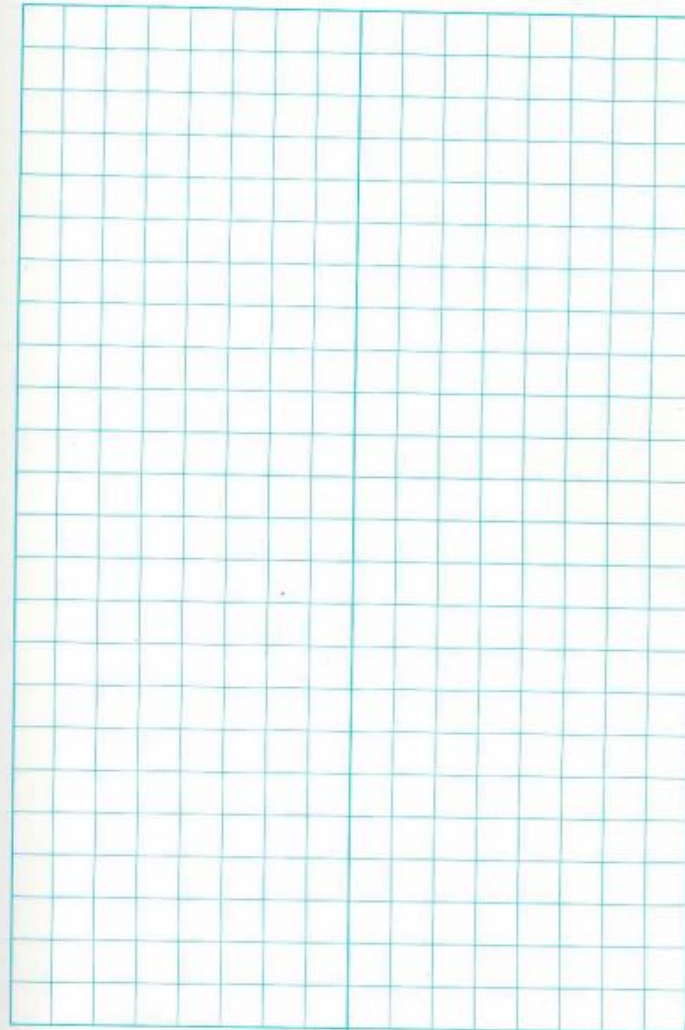
1435 Y-4 depth to sed 10.2'  
 depth to cobble 10.7'

1438 Boat heads to dock

1515 1.6- offsets

Location \_\_\_\_\_ Date \_\_\_\_\_

Project / Client \_\_\_\_\_



*Put in the Rain*